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(*Continued on page* 10)

Indian Standard

SPECIFICATION FOR QUENCHING OIL

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 27 October 1980, after the draft finalized by the Lubricants and Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 This standard was originally published in 1964 and its first revision was taken up in 1974. The present second revision has been prepared as the result of a review of the standard by Metal Working Products Subcommittee and Lubricants and Related Products Sectional Committee in the light of present-day requirements of quenching oil. In this revision the requirements for ash, pour point, flash point, viscosity, volatility and resistance to oxidation for the various grades of oils have been modified. An additional requirement for viscosity index for compounded and additive type oils has also been added.

0.3 In addition to the physico-chemical requirements, a performance test based on GM Magnetic Quenchometer has also been included. Due to lack of technical data, the values for this test have been left to agreement between the purchaser and the supplier.

0.4 Quenching operation is generally carried out in a media, such as (a) water; (b) fatty oils, mineral oils and mixtures of fatty and mineral oils; and (c) molten lead and molten salt baths. The selection of quenching media depends upon the steel used, the hardness and other properties that the metallic article is desired to attain. The important characteristics of a quenching medium, are: (a) the rapidity of transfer of heat from the metal to the medium, and (b) the non-changeability in the properties of the medium through frequent contact with the glowing metal.

0.5 In this standard, three distinct types of quenching oils have been covered, namely straight mineral, compounded and additive types. It is hoped that this standard will ensure production and supply of quality products suitable for such quenching operations as are being used in straight mineral, compounded and additive types of quenching oils.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for quenching oils.

2. TYPES

2.1 The material shall be of the following types:

a) Straight mineral type,

b) Compounded type, and

c) Additive type.

3. GRADES

3.1 The material of the straight mineral type shall be of the following viscosity grades:

a) Light,

b) Medium, and

c) Heavy.

4. REQUIREMENTS

4.1 Description — The material shall be made from refined petroleum oils with or without admixture of fatty oils and/or additives. It shall be clean, homogeneous liquid, free from water, dirt and suspended matter.

4.2 The material shall comply with the requirements given in Table 1, when tested according to the methods prescribed under the appendices to this standard and 'P' series of IS : 1448†. Reference to the relevant method of test is given in col 8 and 9 of the table.

4.3 Performance Requirement — The material shall also pass the Magnetic Quenchometer performance test as specified in IS : 1448 (P : ‡). The value for this test shall be as agreed to between the purchaser and the supplier.

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*Rules for rounding off numerical values (*revised*).

†Methods of test for petroleum and its products.

‡Under preparation. Till such time ASTM D 3520-76 may be used.

5. PACKING AND MARKING

5.1 Packing — The material shall be packed in metal or any other suitable containers as agreed to between the purchaser and the supplier.

5.2 Marking — The container shall be securely closed and marked with the name of the manufacturer; name, type, grade and mass of the material; recognized trade-mark, if any; and with identification in code or otherwise to enable the lot of consignment or manufacture to be traced back.

5.2.1 The container may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

6. SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in IS : 1447-1966*.

6.2 All the requirements given in **4** shall be tested on the composite sample.

6.3 The lot shall be declared as conforming to the requirements of the specification if all the test results on the composite sample satisfy the relevant requirements.

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*Methods of sampling of petroleum and its products.

TABLE 1 REQUIREMENTS FOR QUENCHING OIL

(*Clause* 4.2)

SL No.	CHARACTERISTIC	REQUIREMENT FOR					METHOD OF TEST, REF TO	
		Straight Mineral Type			Compounded Type	Additive Type	Appendices to This Standard	(P:) Methods of IS : 1448*
		Light	Medium	Heavy				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Acidity, inorganic [mg of potassium hydroxide (KOH) per g of the oil]	Nil	Nil	Nil	Nil	Nil	—	P : 2 (Method C)
ii)	Acidity, organic [mg of potassium hydroxide (KOH) per g of the oil], *Max*	0·1	0·1	0·1	1·3	0·6	—	P : 2 (Method A)
iii)	Ash, percent by mass, *Max*	0·01	0·01	0·01	0·05	—	—	P : 4
iv)	Pour point, °C, *Max*	0	0	3	3	0	—	P : 10
v)	Flash point, Cleveland (open) cup, °C, *Min*	160	175	200	175	175	—	P : 69
vi)	Kinematic viscosity at 40°C, cSt	11·5 to 17·5	20·5 to 36	36 to 73	19·5 to 34	19·5 to 34	—	P : 25
vii)	Viscosity index, *Min*	—	—	—	90	90	—	P : 56
viii)	Saponification value, *Max*	0·5	0·5	0·5	5 to 15	—	—	P : 55
ix)	Volatility (loss on heating at 150°C for two hours), percent by mass, *Max*	8	4	3	4	4	A	—

x) Resistance to oxidation:						—	P : 65
a) Kinematic viscosity of the oxidized oil at 40°C, cSt	Not more than 1·70 of the original oil at the same temperature			—	—	—	P : 25
b) Carbon residue (Conradson) of the oxidized oil, percent by mass, *Max*	2·0	2·0	2·0	—	—	—	P : †
c) Insolubles in the oxidized oil, percent by mass, *Max*	0·5	0·5	0·5	—	—	B	—
d) Acidity of the oxidized oil, organic (mg KOH/g of the oil), *Max*	1·0	1·0	1·0	—	—	—	P : 2 (Method A)
xi) Copper strip corrosion test at 100°C for 3 h	←Not worse than No. 1→					—	P : 15

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*Methods of test for petroleum and its products.

†Under preparation. Till such time ASTM D 189-76/IP 13/78 may be used.

APPENDIX A

[*Table* 1, *Item* (ix)]

TEST FOR VOLATILITY

A-1. PROCEDURE

A-1.1 Weigh 20 ± 1 g of the material in a glass petri dish of approximately 9 cm diameter and keep the dish in a ventilated oven maintained at 150 ± 2°C for two hours. Cool the dish with its contents in a desiccator to room temperature and then weigh accurately. Calculate the loss in mass as a percentage on the mass of the material taken for the test.

APPENDIX B

[*Table* 1, *Item* (x) (c)]

DETERMINATION OF INSOLUBLES IN THE OXIDIZED OIL

B-1. REAGENT

B-1.1 Petroleum Hydrocarbon Solvent* — conforming to the following requirements:

a) Density at 15°C	0·679 8 to 0·689 8 g/ml
b) Distillation test:	
i) Initial boiling point, *Min*	55°C
ii) Distillation between 60°C, and 80°C, percent by volume, *Min*	90
iii) Final boiling point, *Max*	90°C
c) Doctor test	Negative
d) Colour	Waterwhite (1·0)
e) Residue on evaporation, mg/100 ml	2
f) Bromine number, *Max*	1

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*Normal heptane (the quality used as primary reference fuel) may also be used.

B-2. PROCEDURE

B-2.1 Oxidize the oil as prescribed in P: 65 of IS : 1448*. Weigh about 10 g of the well stirred oxidized oil, accurate to the nearest 0·1 g, in a 250-ml conical flask, add 100 ml of petroleum hydrocarbon solvent and after thorough mixing allow it to stand in the dark for 16 to 24 hours. Decant the clear liquid in the conical flask through an accurately weighed Whatman filter paper (No. 40) or equivalent, which was previously dried at 95 to 100°C. Care should be taken to prevent the sludge from coming to the filter paper at this stage. Wash the insolubles in the flask twice by decantation, using 75 ml of petroleum hydrocarbon solvent in each operation. Wash the insolubles on the filter paper using more of petroleum hydrocarbon solvent and finally wash it on the filter paper until it is free from oil. Transfer the filter paper with the insolubles to an oven maintained at 95 to 100°C and dry it to constant mass.

B-2.1.1 Express the mass of insolubles as a percentage of the mass of the oxidized oil taken for the test.

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*Methods of test for petroleum and its products.

(*Continued from page* 2)

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[*Page* 4, *clause* **2.1**(a)] — Delete the word 'Straight'.

(*Page* 6, *Table* 1, *col* 3, 4 *and* 5) — Delete the word 'Straight'.

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